As a follow up to our meeting on October 9th between Shell and EPA, we would like to update you on two items that were discussed regarding the mudline cellar (MLC) construction using remotely operated vehicle (ROV) technology.

On June 18, 2014, Shell submitted to EPA a document designated as Confidential Business Information describing the technology, and an evaluation of the impact of the discharge of additional drill cuttings. Upon review of this document, EPA had several questions that we have addressed in subsequent correspondence.

The two items still outstanding are: 1) potential issues related to the additional volume of drill cutting material to be generated by the ROV method versus conventional MLC construction using a drill bit, and 2) the validation by EPA of the modeling Shell submitted to support the impact evaluation. These two items are further discussed below.

1. In Shell's June 18, 2014 submittal, we stated that the drill cuttings generated during construction of the MLC by ROV (discharge D013) will be approximately 27,197 barrels of material. This compares to 4,152 barrels of material that EPA was provided by oil and gas operators for evaluation in the ODCE. As was mentioned in our meeting on October 9, 2015, this represents approximately a factor of 7 increase in D013 material discharged. However, the discharge associated with MLC construction only represents a portion of the total and does not account for the full discharge volume from the drilling of a complete well to total depth (TD).

   From data in the ODCE, 17,652 barrels of material were evaluated as a maximum discharge case based on information provided to EPA in 26 NOIs submitted by offshore operators. Using an MLV ROV system, Shell estimates that approximately 39,884 barrels of material will be discharged from the drilling of a complete well to TD based on our current well design. This reduces the increase of total volume of material for the entire well to approximately a factor of 2 greater than the maximum discharge volume evaluated in the ODCE. Shell would like to re-emphasize that the area of the discharge affected by drill cuttings deposition greater than 1 cm depth from the MLC by ROV construction is roughly 240 meters X 40 meters (or 0.981 hectares) under mean current conditions, and will settle out within 100-200 meters of the discharge location, consistent with impacts analyzed in the ODCE.
2. Shell has reviewed the TetraTech modeling report provided by EPA and based on OOC model version 2.5, which is based on input data provided in the Technical Report "Drill Cuttings Modeling for Mud Line Cellar by Remotely Operated Vehicle" by Fluid Dynamix, dated May 21, 2014, which is based on OOC model version 3.0. As a result, Shell requested our modeler (Fluid Dynamix) look at the TetraTech report and provide a potential rationale as to the difference in the discharge output resulting from OOC model versions 2.5 and 3.0.

   Fluid Dynamix noted that there are a few key modeling inputs that were not apparent in the TetraTech report. They are: Cell size, Model time step, and Total number of cells. Can EPA please confirm what Cell size, Model time step, and Total number of cells was used by TetraTech? Fluid Dynamix used the following parameters: Cell size 20-meters, Time step 900-seconds, and Total number of cells 500 x 500. These parameters are input by the modeler, and each can have an impact on the results of the model run. Generally, the smaller the cell size and time step, the more accurate the model results should be. Version 3.0 allows for more resolution of these parameters, which increases the overall accuracy of the model and can generate differences between models performed in 2.5 versus 3.0. Another one of the

differences between versions 2.5 and 3.0 is the maximum number of available cells, with version 2.5 having a maximum of 150. Also, the duration of discharge allowed in model version 3.0 is higher than in version 2.5. Shell was able to model a 7-day (604,800-seconds) discharge with a 900-second time step, in version 3.0. Version 2.5 will not be able to accommodate this duration.

Fluid Dynamix believes that if the modeling is completed in versions 2.5 and 3.0 using the same input parameters (to the extent possible), the results should be more comparable. Recognizing that there are limitations in version 2.5 (particularly with respect to number of cells and the allowable duration), Fluid Dynamix recommends that the EPA consider modeling in version 2.5 be completed using a 20-meter Cell size, and that the Time step be 1800-seconds for the full 7-day discharge. This should produce results that will be largely reflective of actual discharge conditions and in good agreement with the modeling completed in version 3.0 (Fluid Dynamix predicts approximately 90% agreement)

Please let us know if you have additional questions.